What is claimed is:

1. A modem having a transmit path carrying a transmit signal, a receive path carrying a receive signal, and an echo canceler, the transmit path including an inverse fast Fourier transform (IFFT) circuit for converting the transmit signal from the frequency domain to the time domain and the receive path including a fast Fourier transform (FFT) circuit for converting the receive signal from the time domain to the frequency domain, said echo canceler comprising:

a cyclic echo synthesizer sub-canceler (CESS) having an input for receiving the transmit signal in the time domain and further having an output for producing a cyclic echo signal;

a first algebraic combining unit for adding said cyclic echo signal to the receive signal in the time domain;

an echo canceler having an input for receiving the transmit signal in the frequency domain, an adaptive input for receiving an adaptive signal, and an output for producing an echo cancellation signal based on the transmit signal and said adaptive signal;

a second algebraic combining unit for subtracting said echo cancellation signal from the receive signal in the frequency domain to produce a resultant signal at an output; and

a frequency domain equalizer having an input coupled to the output of said second algebraic combining unit for receiving the resultant signal, said frequency domain equalizer producing said adaptive signal.

2. The echo canceler of claim 1, wherein said frequency domain equalizer comprises:

an equalizer having an input coupled to the output of said second algebraic combining unit and further having an output;

a slicer having an input coupled to the output of said equalizer and further having an output;

a third algebraic combining unit for subtracting the input of said slicer from the output of said slicer to produce a difference signal at an output; and

an inverse equalizer coupled to the output of said third algebraic combining unit, said inverse equalizer producing said adaptive signal at an output.

3. The echo canceler of claim 1, further comprising:

a frame alignor having an input for coupling to the output of said first algebraic combining unit, said frame alignor producing a frame alignment signal, wherein said cyclic echo synthesizer sub-canceler further has an adaptive input for receiving said frame alignment signal.

4. The echo canceler of claim 3, further comprising:

a switch coupled between the input of said frame alignor and the output of said first algebraic combining unit, said switch coupling the input of said frame alignor to the output of said first algebraic combining unit during a training period for frame synchronization of said cyclic echo synthesizer sub-canceler.

5. The echo canceler of claim 1, further comprising:

a pilot tone extractor having an input for receiving the receive signal in the time domain and further having an output for producing a pilot tone cancellation signal to cancel pilot tones within the receive signal.

6. The echo canceler of claim 5, further comprising:

a first switch coupled to the input of said pilot tone extractor for selectively coupling said pilot tone extractor to the receive signal in the time domain; and

a second switch coupled between the output of said pilot tone extractor and the first algebraic combining unit for selectively coupling said pilot tone extractor to a subtractive input of the algebraic combining unit;

wherein during a training period, said first and second switches are closed to cancel said pilot tones within the receive signal in the time domain.

7. The echo canceler of claim 1, further comprising:

a repeater having an input for receiving the transmit signal in the frequency domain and further having an output coupled to the input of said echo canceler.

8. A modem for establishing communication between a first device and a second device via a communication medium, said modem passing data generated by the first device to the communication medium and passing data from the communication medium to the first device, said modem coupled to the communication medium through a hybrid circuit, said modem comprising:

a transmit encoder having an input for receiving data from the first device and an output for passing a transmit signal;

an inverse fast Fourier transform circuit for converting said transmit signal from the frequency domain to the time domain;

a D/A converter having a digital input for receiving said transmit signal in the time domain and further having an analog output for coupling to the hybrid circuit, said D/A converter converting said transmit signal from digital to analog at a sampling rate;

an A/D converter having an analog input for coupling to the hybrid circuit and a digital output, said A/D converter converting a receive signal received from the hybrid circuit from analog to digital, said A/D converter converting said receive signal from analog to digital at said sampling rate;

a cyclic echo synthesizer sub-canceler for receiving said transmit signal in the time domain to generate a cyclic echo signal;

a first algebraic combining unit for algebraically adding the cyclic echo signal to said receive signal in the time domain;

a fast Fourier transform circuit for converting said receive signal from the time domain to the frequency domain;

an echo canceler having an input for receiving said receive signal in the frequency domain, an adaptive input for receiving an adaptive signal, and an output, said echo canceler generating an echo cancellation signal at the output;

a second algebraic combining unit for algebraically subtracting the echo cancellation signal from said receive signal out of said fast Fourier transform;

a frequency domain equalizer for processing said receive signal from said second algebraic combining unit to minimize intersymbol interference in said receive signal at an output, said frequency domain equalizer generating said adaptive signal; and

a receive decoder having an input coupled to the output of said frequency domain equalizer for receiving said receive signal and further having an output for coupling to the first device.

9. The modem of claim 8, wherein said frequency domain equalizer comprises:

an equalizer having an input coupled to the output of said second algebraic combining unit and further having an output;

a slicer having an input coupled to the output of said equalizer and further having an output;

a third algebraic combining unit for subtracting the input of said slicer from the output of said slicer to produce a difference signal at an output; and

an inverse equalizer coupled to the output of said third algebraic combining unit, said inverse equalizer producing said adaptive signal at an output.

10. The modem of claim 8, further comprising:

a frame alignor having an input for coupling to the output of said first algebraic combining unit, said frame alignor producing a frame alignment signal, wherein said cyclic echo synthesizer sub-canceler further has an adaptive input for receiving said frame alignment signal.

11. The modem of claim 10, further comprising:

a switch coupled between the input of said frame alignor and the output of said first algebraic combining unit, said switch coupling the input of said frame alignor to the output of said first algebraic combining unit during a training period for frame synchronization of said cyclic echo synthesizer sub-canceler.

12. The modem of claim 8, further comprising:

a pilot tone extractor having an input for receiving the receive signal in the time domain and further having an output for producing a pilot tone cancellation signal to cancel pilot tones within the receive signal.

13. The modem of claim 12, further comprising:

a first switch coupled to the input of said pilot tone extractor for coupling said pilot tone extractor to the receive signal in the time domain during a training period for training said cyclic echo synthesizer sub-canceler; and

a second switch coupled between the output of said pilot tone extractor and the first algebraic combining unit for coupling said pilot tone extractor to a subtractive input of the algebraic combining unit during said training period;

wherein during said training period said first and second switches are closed to cancel said pilot tones within said receive signal in the time domain.

14. The modem of claim 8, further comprising:

a repeater having an input for receiving the transmit signal in the frequency domain and further having an output coupled to the input of said echo canceler.

15. The modem of claim 8, further comprising a timing adjustment circuit having an input coupled to the output of said first algebraic combining unit and an output for adjusting said sampling rate.

16. The modem of claim 15, said timing adjustment circuit comprising:

a voltage controlled crystal oscillator having an input and further having an output for adjusting said sampling rate; and

a phase locked loop having an input configured to receive said receive signal in the time domain during a training period to train said cyclic echo synthesizer sub-canceler and to receive said receive signal in the frequency domain after said training period, said phase locked loop further having an output coupled to the input of said voltage controlled crystal oscillator.

17. In a modem an echo cancellation method, said modem for establishing communication between a first and a second device via a communication medium, said modem passing a transmit signal generated by the first device via a transmit encoder to the communication medium and passing a receive signal from the communication medium to the first device via a receive decoder, said modem comprising an inverse fast Fourier transform circuit for converting said transmit signal from the frequency domain to the time domain and a fast Fourier transform for converting said receive signal from the time domain to the

frequency domain, said modem coupled to the communication medium through a hybrid circuit, said echo cancellation method comprising:

generating a cyclic echo signal based on the transmit signal in the time domain using a sub-canceler structure;

adding said cyclic echo signal to the receive signal in the time domain;

generating an echo cancellation signal based on the transmit signal in the frequency domain and an adaptive signal;

subtracting said echo cancellation signal from the receive signal in the frequency domain; and

generating said adaptive signal based on the receive signal after subtracting said echo cancellation signal.

18. The method of claim 17, wherein generating said cyclic echo signal comprises:

aligning frames of the transmit signal with frames of the receive signal having echoes corresponding to the transmit signal.

19. The method of claim 17, further comprising:

extracting a pilot tone from the receive signal during a training period.

20. The method of claim 17, wherein generating said adaptive signal comprises:

equalizing the receive signal in the frequency domain after subtracting said echo cancellation signal;

slicing the equalized receive signal;

subtracting the receive signal prior to slicing from the receive signal after slicing to obtain a difference signal; and

inverse equalizing said difference signal to derive said adaptive signal.